

EMPYAEMA IN CHILDREN.

A T H E S I S

by

HUGH MEREDITH SPEIRS, M.B., Ch.B. Edin. 1900.



FRONTISPIECE.



The saddest part of all the treatment of
Empyema in Children is the daily dressing
(p.48).

INTRODUCTION.

That, "There is nothing new under the Sun," is an old adage, which comes forcibly to one about to choose a subject for a Thesis. But, in having been fortunate enough, to come in contact with a number of cases of Empyaema, while acting as House Physician to one of the oldest Children's Hospitals in Great Britain; and having been struck by the frequency with which such cases crop up in practice, (2% of all cases) and alas! by the frequency with which they are not recognised, it seemed to me that a short paper on the subject, with especial reference to the treatment might be interesting and instructive to myself at least.

When I say "Empyaema in Children" I mean children from the age of three months up to, and including thirteen years. Such being the age limit of most hospitals which are built and worked for the benefit of our little ones.

As far as possible I shall keep to this age in working up my notes and statistics on the subject.

HISTORY:

Before plunging into the more serious matter before me I can't help looking into the History of Empyaema. For it is indeed a disease with a history. To begin at the beginning one has to go back 2300 years or more to a small island in the Grecian Archipelago "Cos" where we are told "The Father of Surgery and of Medicine, too," Hippocrates was born in B.C. 460. If we turn to his notes on Empyaema what do we find? That Hippocrates was treating his cases of Empyaema in exactly the method prescribed to-day.

The teaching of Hippocrates was as follows :-

"Having carefully washed your patient with warm water, you must seat him on a firm chair, and then, while your assistant steadies his hands, you must "gently shake him by the shoulders in the hope of "obtaining a splashing sound in the affected side of "the chest. (This method of diagnosis is certainly a little drastic - but the act of succussion is hardly unheard of even now).

"Operation should not be performed before the 15th

"day after the beginning of his illness. An

"incision must be made through the skin, where the

"pain and the swelling are most evident, and then the

"pleura must be opened, either by trephining the rib,

"or/

"or with a sharp instrument or with the actual
"cautery.

"When a sufficient quantity of pus has been let
"out (and those who suffer from empyaema or dropsy
"of the chest are sure to die if you rapidly evacuate
"the pus or the water), you must keep the wound open
"with a strip of linen cloth, secured with a thread.
"This strip must be removed daily, that the remainder
"of the pus may run out. On the tenth day after the
"operation you must irrigate the cavity with warm
"wine and oil, for the purpose of cleansing the
"surface of the lung; these irrigations must be
"made twice a day. Finally when the discharge has
"become thin and serous you must keep a small rod
"of metal in the wound, using a smaller size from
"time to time, till the whole wound has healed."

Allowing for changes of custom and climate, you
have here almost the identical treatment of to-day.
If this is so why was the good treatment abandoned.
The root of the evil was the invention of the
aspirating syringe by Galen; the Hippocratic
treatment fell into disrepute, and there was no new
method to take its place and incision either with the
knife or actual cautery was almost wholly abandoned,
except by a few of the Arabian Physicians. By the
time of the Renaissance, with the return to Greek
art and literature, it was too late to go back to
Hippocrates.

Surgery/

Surgery had earned for itself an evil reputation by the bad results of septic wounds, and it was thought to be quite as disastrous to let "air" into the pleura as pus out. Thus it happened that the art drifted into that unfortunate period when Empyemata were treated by simple puncture, even by such experienced practitioners as Ambrose Pare, Guy de Chanliar and Linnec. The knowledge that puncture for a serous effusion was sure to let in air, and convert what was a simple Pleurisy into an Empyema, became a fixed delusion, and fixed it might be this day had not Lister been born. That Hippocrates in the clean air of the Island of Cos might with impunity open the pleural cavity (or the peritoneal for that matter), whilst his disciples in the Middle Ages in the crowded and filthy hospitals, only courted disaster even in simple cases - was as great a puzzle 400 years ago as it would be to us now but for our knowledge of aseptic or clean Surgery. The modern treatment of Empyema is a revival of the oath of Hippocrates. ἀγρῶς δὲ καὶ ὁσιῶς διατηρήσω βίον τὸν ἐμὸν καὶ τέχνην τὴν ἐμήν.

"In purity will I practice my art," if by purity was understood - clean surgery.

Even as recently as 1872 M. Bouchut published a case of empyaema in a boy aet. 9 cured in 16 months/

months after 58 punctures.

Nor did free incision, before Lister, fare much better. Out of twelve cases under Velpeau none recovered; out of fifty cases under Dupuytren, forty eight died; and Sir Ashley Cooper "mourned the fact that he never had a single cure."

BACTERIOLOGY.

In a simple serous effusion or Pleurisy there are no organisms according to Kracht. The question naturally arises, where do they come from? Is an Empyema an Empyema "de novo", or does it always commence as a simple Pleurisy?

I am inclined to think they are such from the beginning. We have no proof that an Empyema of the Antrum of Highmore, or again that a Mastoid Abscess or any other collection of pus in the body commences as a simple aseptic effusion.

In three separate cases, I have examined a child's chest one day and found nothing, on the next there was dulness and on the third day the dulness increasing I have drawn off pus. Was there time for such cases as these to change from a simple to a purulent fluid in 48 hours? Bouveret describes similar/

similar cases "Pleurésie d'emblée suppurative" in
Traité de l'Empyème 1888.

That there is a slight exudation of lymph,
thrown out at first is only natural; but that every
case of Empyaema is first of all a simple Pleurisy
to the extent of say twenty ounces, which then
becomes septic, is I think wrong.

There are cases of course of simple Pleurisy
becoming Empyaemata through the introduction of
septic matter from outside e.g. by using a dirty
needle to tap a chest.

Under this heading "Bacteriology" a separate
account could be written according to the different
natural histories of the various micro-organisms
which occur in Empyaemata.

Holt says "The cases may be divided up into
three classes.

"Firstly those containing the Pneumococcus and Pneumo-
"bacillus in pure culture. This is by far the largest
"group and includes nearly all the cases secondary to
"Pneumonia, the Pleura being infected directly from
"the lung by means of the Lymphatics.

"Secondly those containing other Pyogenic organisms;
"particularly the Streptococcus pyogenes and the
"Staphylococcus, both alone and in company with the
"Pneumo-coccus. Of these the Streptococcus is the
"most important as it is often found with the Pneumo-
coccus.

This/

This combination is likely to be found in cases secondary to Broncho Pneumonia following one of the Zymotic diseases.

The Streptococcus and Staphylococcus occur in the Pleurisy of Pyaemia or when an abscess has ruptured into the pleural cavity.

"Thirdly cases due to the Tubercle Bacillus, which is very difficult to find." From this fact Ley has stated that if no bacteria be found in the pus from an Empyaema, the case is likely to be Tuberculous. This is not quite correct though, for you often get a simple case of Pneumococcal Empyaema in which the organisms have failed to overcome the resistance of the tissues, and have themselves become disintegrated; the pus here giving a negative result.

Holt gives a list of his 37 cases :-

In 19 cases	the	Pneumo-coccus	was found alone.
In 14	" "	Streptococcus	" " "
In 1 case	"	Staphylococcus	" " "
In 3 cases	"	Pn: + Strepto:	in combination.

In my own 22 cases.

In 10	the	Pneumococcus	was found alone.
In 6	"	Streptococcus	" " "
In 3	"	Pn + Strepto	were found
In 2	"	Tubercle Bacillus	were found alone.
In 1	"	Typhoid Bacillus of Eberth	was found.

From/

PLATE. QI



Extreme thickening of pleura, with formation
of a small circumscribed cavity at its
lowest point. (Paget. page 222).

From the above lists it is seen that by far the commonest form of Empyaema is that due to Frankel's Pneumococcus. In this form of pure Pneumococcal Empyaema, where the organism is known to be short lived, you may have absorption taking place, with the formation of a hard calcareous mass Plate I

Pell (Zstchr: Klin. Med. Berlin 1890)

three cases of small circumscribed has recorded, Empyaemata, two after pneumonia and the third doubtful. In all, the diagnosis was proved by puncture, and all became absorbed without further interference.

I have also seen cases on the Post Mortem table, with a history of Pneumonia at say 2 years and death from some other cause at 6 years.

The examination revealed a hard calcareous mass in the pleura, or a thickened pleura forming a small cavity with caseous contents. Obviously these have been cases of simple Pneumococcal Empyaema, which had become absorbed.

Under Holts second heading we have indeed a large variety of Empyaemata, in number of cases almost as large as Class I

Here you have the simple Pneumococcal Empyaema which has become infected with Strepto ~~or~~ Staphylococci either indirectly from the lung or Intestine (via the Lymphatics); or directly by the septic needle of a diagnostic puncture.

The/

PLATE. 01



Extreme thickening of pleura, with formation
of a small circumscribed cavity at its
lowest point. (Paget. page 222).

The pus in this form of Empyaema stinks abominably: while in the pure Pneumococcal form it simply smells like warm sour cream.

The history of such cases are very much alike :-
 "Child had cough two months ago, treated by a
 "Doctor, but did not get quite better. Later Doctor
 "put a needle into babies' side and drew off some
 "matter. He said baby had to go into hospital and
 "be operated on."

Parents as a rule don't believe him, and put off for a week or so, till the child is very much worse; and when the chest is opened there is a rush of clotted pus, and gas, with the foulest odour imaginable.

Under this class you have other forms such as the traumatic Empyaema; which, however is rare in children; though common in adults from punctured wounds of the chest, in which case you may have any form of organismal infection.

Gangrene of the lung, and Empyaema after one of the Zymotic Fevers are the commonest causes of strepto: and staphylo-coccal Empyaema.

Among the rarer forms one may get an Empyaema complicating a case of Pyaemia; or spreading from an acute epiphysitis; but as these are very fatal cases, one has hardly time to study them, nor is one justified in saying that death was due to the Empyaema.

Before/

Before passing on, I may say that one of my cases was due to Eberth's Bacillus, and the history of the child was very interesting.

Mary G. aet.7

Admitted November 1901.

Family History: Good.

History of Present Illness: On September 6th 1901

Patient was ill - had diarrhoea and was feverish. There was a case of Typhoid Fever in next cottage. Patient got better and was sent away but came back in October feeling ill again. On October 26 her younger brother was admitted with Typhoid and her elder sister with Typhoid Fever and meningitis. A week later patient herself admitted, with pain in right side and cough. A diagnosis of Emphysema was made, and a piece of the 8th Right rib resected. About 30 Oz of thin dark fluid let out with a peculiar odour. This was examined and Eberth's bacillus found. Later patient gave positive result with Widal's reaction. Patient made an uninterrupted recovery in six weeks. Her brother also recovered, but her sister died of Typhoid Meningitis.

Drs. White and Wood in the Therapeutic Gazette Detroit Aug 15 1894 have collected similar cases. Keen (Philadelphia 1900) has also collected 5 cases of/

PLATE. II.



Photo of a Tubercular Empyema, after 3 months treatment, showing dirty sloughing wound.

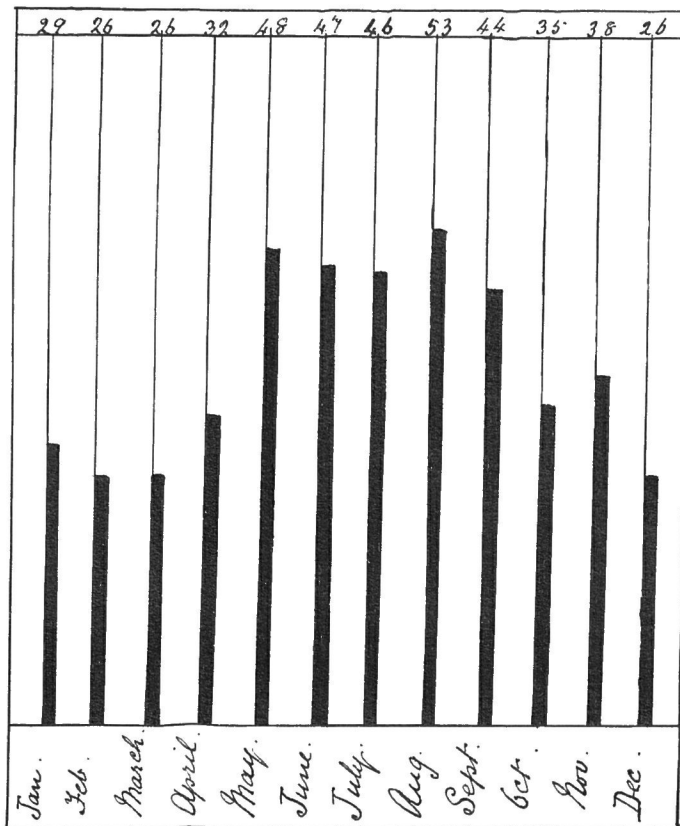
of Empyaema in which a pure culture of Eberth's bacillus was found. Some of them were associated with abscess or gangrene of the lung and pus in the mediastinum.

The tubercular form of Empyaema is fortunately not so common as the preceding forms, in childhood.

I say, fortunately, for it is this form which takes so long to heal, if at all. In simple pneumococcal Empyaema you have your patient out of hospital in six weeks; in Tubercular Empyaema you are lucky if he heals under three months. (PLATE II.)

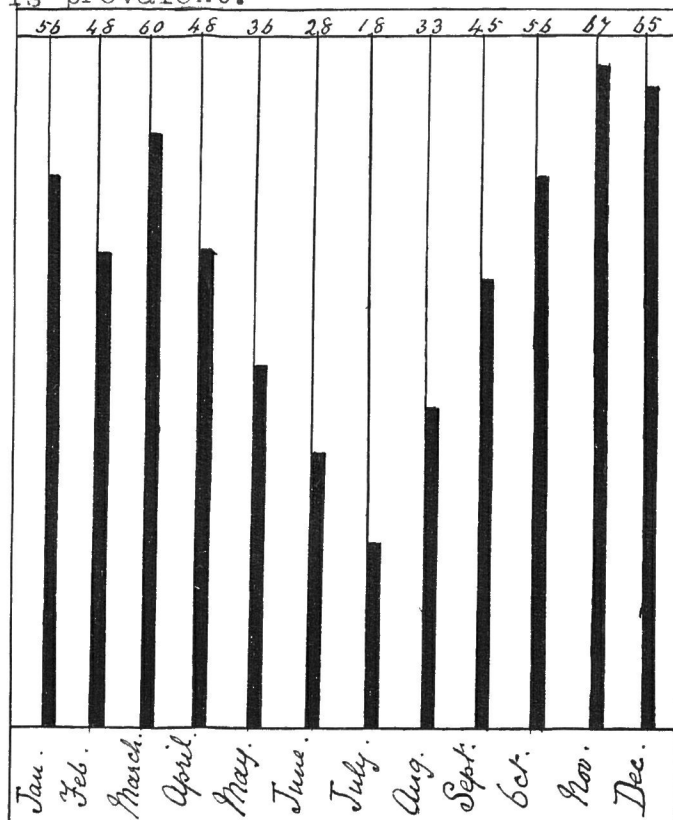
They are due to direct infection from the lung, Peritoneum or Tubercular caries of bone, and their treatment other than that described later: can only be carried out satisfactorily in a Sanatorium.

Fig. 1



Compare Fig.1, showing the months at which Empyaema occurs, with Fig.2, which shows when Broncho Pneumonia is prevalent.

Fig. 2.



CAUSES of EMPYAEMA.

As we have already seen, fully 50% to 75% of the cases of Empyaema in children under 5 years follow Broncho-Pneumonia. (Vide Plate III.)

In many cases the collection of pus masks the Pneumonia before it is diagnosed, and so the Empyaema is said to have arisen de novo.

Scarlet Fever, Measles, Chicken Pox, and Pertussis, the chief of the Zymotic Fevers are nearly always precursors of the disease, and are said by some authorities to be direct causes; or that the Empyaema is a sequela.

Tuberculosis is a rare cause in early childhood, but becomes more frequent after the 7th year.

Pyæmia in all its forms may be a direct cause.

It has occurred in the newly born from direct infection through the umbilical wound, but such cases are rare.

Empyaema may even occur as an Ante Natal disease.

It is seen following Acute Epiphysitis, Osteomyelitis and Periostitis; also it may complicate suppurative conditions of the Peritoneal cavity. I have had two cases following Acute Appendicitis.

Local causes, which are comparatively rare in children, include puncture wounds of the chest, necrosis of a rib or vertebrae (generally tubercular) and/

PLATE. IV.



Empyaema of right side, in a child suffering from Rickets.

and rupture of an abscess into the Pleural cavity.

The condition of the patients home and nourishment have a marked effect on the production of Empyaema, for you see it more often in hospital and dispensary practice among the very poorest, than in private life, more especially among those children who are suffering from or are liable to Rickets. PLATE IV.

Age is also a factor, in connection with the predisposing causes of Empyaema, as will be seen by a glance at Plate X, for by far the greater number occur below .5 than above it.

The sex can hardly be considered as a cause in children. Though as a matter of fact 62.9% of my cases were in boys to 37.1% in girls; and it was the rule to admit all cases of Empyaema to hospital.

The season of the year as a cause predisposing to Empyaema might be considered, if one only took a casual glance at PLATE III.Fig1, but looking further at PLATE III.Fig.1 one sees that the months in which the disease occurs most are those 2 to 3 months after Broncho - Pneumonia is at its height. That is Broncho - Pneumonia is rife during the winter and Spring while Empyaema follows it in Summer and Autumn.

SYMPTOMS and PHYSICAL SIGNS.

These vary a good deal according to the age of the child. When Empyaema follows a Broncho Pneumonia or one of the Zymotic fevers; the history is generally one of interrupted convalescence with a return of the fever or cough.

This history as given by the Mother is very characteristic - for example

Mary C: aet. 4. Admitted January 20 1901.

Family History. Parents and three children strong and healthy.

Previous Illness. Measels in October last.

Present Illness. Pneumonia in December when she was attended by a Doctor. Has wasted very much since and has gradually become worse. Is very fretful. At times drowsy and feverish. Does not sleep well and sweats a good deal at night. Appetite poor. Bowels constipated. Temperature on admission 99.6.

Here you have a very beautiful picture of the commonest form of Empyaema, namely one following a Zymotic fever and Pneumonia. The mother has become tired of the Dispensary Doctor, or he himself has suspected the condition and sent her into Hospital.

What is the first thing one notices about a child who is suffering from Empyaema? In answering this /

PLATE. V.



The Physiognomical Diagnosis of Empyema.

this question I cannot do better than quote Thomson on Physiognomical Diagnosis :-

"Under normal conditions the child's face is comparatively free from those lines and furrows which in adults are regarded as denoting character.

Some of the changes which disease produces in the physiognomy are indeed so definite and constant that they may almost rank among the Physical Signs."

Then to quote further I may apply his word picture on the physiognomy of Pneumonia to that of Empyaema.

"The child is too ill to notice much or to hold up his head which is lying back on his mother's arm.

His face is flushed and his eyes bright, although their expression is dull and anxious. His eye brows are oblique from the action of the corrugator supercillii on each side, along with the central bundle of the frontales.

His nostrils are dilated and working, the angles of the mouth are lowered and the lips slightly parted, so as to admit a little air during the laboured breathing. The general expression of the child's face is that of suffering, modified by a desire not to cry because of the pain which a long breath would cause." Verbatim this describes the photos shown (Plate V)

So marked was the Physiognomy of an Empyaema that my colleagues in collecting the patients Hospital letters/

PLATE. VI.



An Empyaema of the right side, showing the
bulging of the chest.

letters of recommendation in the Out Patient waiting hall; often had competitions as to who could recognise the most cases.

The Physical Signs are almost those of Pleurisy. The attack commences with a short cough, difficulty of respiration and the affected side moves more slowly than the other. If the child is old enough he will complain of pain either on that side or over the epigastrium; and certainly on the affected side if pressure is applied.

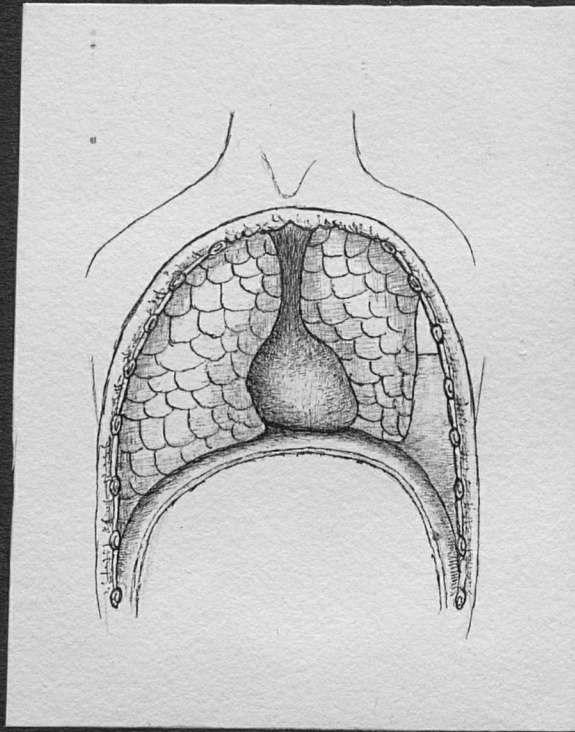
In very young children (i.e. those under 3 years) the attack may commence with convulsions; but this is comparatively rare and I have only had one case.

There is usually a distinct fulness or bulging in the intercostal spaces on the affected side, if the Empyaema is a large one, or of some duration.(PLATE VI.)

The heart is invariably displaced more especially when ^{the} Empyaema is on the left side. This is readily seen by the position of the Apex beat, which is pushed over into left or even right lateral sternal line, when the collection of pus is left sided, and when it is right sided you may even have it in the left axillary line.

In chronic cases when retraction has taken place, you have the pendulum swung the opposite way; and the heart may be drawn to the diseased side. This is/

PLATE. VII.



is not so misleading as it sounds for you would have other signs or deformities to guide you.

On Percussion and Palpation you have all the signs of fluid in the chest as in a pleurisy. The vocal fremitus is hardly so clear, or the percussion note so absolutely dull as in Pleurisy. This may be due to the fact that the decomposing pus may contain a certain quantity of gas, making the condition almost one of Pyo-Pneumo-Thorax. The area of dulness is bounded in many cases by a zone of hyper-resonance which is slightly misleading. This condition is explained by a glance at PLATE VII. when you see the fluid rising to a certain height, pushing the lung inwards, away from the chest wall leaving a hollow space round the Empyema.

Auscultation. While the breath sounds on the healthy side are loud and clear ("Puerile"); on the affected side they are weak and distant, and may be absent altogether.

If you have a patch of Pneumonia or collapsed and consolidated lung, under a thin layer of pus; you may have the breath sounds translated to your ear as normal (?) This difficulty being increased by the fact that the breath sounds of the healthy side are always exaggerated - from the increased work which that lung is doing.

Vocal resonance as in vocal fremitus is of little/

little value, the children are as a rule too young to speak, and their voices too weak and high pitched to be heard clearly.

The temperature is not by any means a constant sign in Empyema. When the disease follows close on the heels of Broncho Pneumonia, the temperature may not have fallen before the second condition has been diagnosed; but if it is of some duration the temperature on admission may be normal as often as not.

If there is any temperature it usually falls after the operation, and remains normal along the course of the disease, rising only when there is an extra collection of pus due to defective drainage.

DIAGNOSIS.

The diagnosis of an Empyaema is a comparatively simple matter - yet how often it is missed. You have a child brought to you, with a cough, slight evening rise of temperature, looking ill, and with a history of a prolonged convalescence from Broncho-Pneumonia or one of the Zymotic fevers, and as the mother says "getting no better."

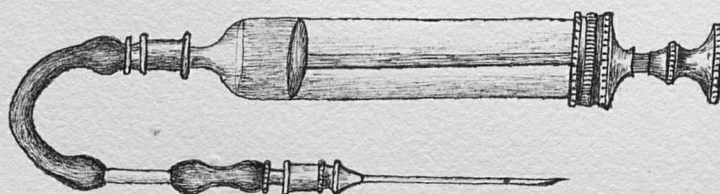
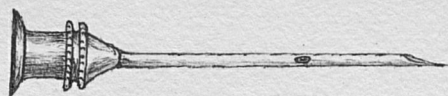
Examine the chest at once for a weak respiratory murmur and dulness, and once having found it, do not hesitate to make an exploratory puncture. The presence of pus after the use of the aspirating needle is the only sure diagnostic sign of an Empyaema.

Great care must be exercised in your choice of a needle, for if you get a negative result, it does not mean that there is no pus in the pleural cavity.

The pus is often so thick and clotted that it won't run up an ordinary needle; hence the importance of having a properly constructed instrument.

The needle I have the greatest predilection for is described briefly as follows. It is from 2 to 4 centimetres in length, and 1 millimetre in thickness, with an extra eye in the side of the needle 2 millimetres from the point. This needle is not attached directly/

PLATE. VIII.



directly to the syringe; but is connected up with a short tube made up of three parts, viz rubber, glass and rubber in the order given. The pus, in this way, need never enter the barrel of the syringe which is always a difficult instrument to sterilize; while the connecting tube and the needle can be boiled with ease in an ordinary test tube.

Vide Plate (VIII).

The method of making a diagnostic puncture is as follows. Carefully wash your hands and sterilize the skin over the area of absolute dulness ; choose a site between the ribs, and draw down the skin with the left hand, and plunge the needle in with the right, guarding it for half its length with the index finger and thumb. Attach the syringe to the tube and draw up the piston. If no fluid appears at the little glass window, pass the needle further in and try once more. If still unsuccessful draw it almost out and try again, as it sometimes happens that the needle has gone right through the cavity into the lung beyond, if it had not gone through the thickened pleura at first. Having failed in your third attempt, withdraw your needle altogether and the skin you had pulled down will immediately fly back into position, closing the puncture wound like a valve. Look carefully at the point of your needle for/

for a tiny clot of pus may have been the cause of your failure. Here it is the second eye to your needle gives you an extra advantage.

Do not be positive there is no pus there till you have tried again in at least two different sites; for as was said before this is the only true and certain point in the diagnosis of an Empyaema.

You often find Empyaemata localised to a small patch of the chest and they are correspondingly difficult to find. The commonest site however for such a localised patch is at the angle of the scapula, though they may occur anywhere; even over the apex of the lung where they have a deep resonance which increases the difficulty of their diagnosis considerably.

Among the newer methods of diagnosis one must look at the assistance given us by the Rontgen Rays ; and by a systematic examination of the blood.

The Rontgen Ray has lately been considerably used as an aid to diagnosis in Medicine as well as in Surgery.

Williams in his admirable book on the Rontgen Rays says with reference to the chest (Chap XIII).

"Broadly speaking, it may be said that a darkened apex naturally suggests a beginning pulmonary tuberculosis, a darkened area in the middle of the lung pneumonia, and a darkened area in the lower portion/

portion a pleurisy with effusion or an empyaema."

If it is a question whether the lung is involved, or whether there is fluid in the pleural sac, it should be borne in mind that in the latter case there is more apt to be a change in the position of the neighbouring organs, which is seen on the screen, and also that the appearance is likely to vary when the patient is examined in different positions. Also as to the character of the fluid, pus is more opaque than simple serum.

In the case of a collection of fluid encysted in the pleural membrane between the lobes of the lung; the serum would show a darkened area provided the rest of the lung were clear.

It would not be possible to get such direct information from Physical Signs alone.

The systematic examination of the blood is useful so far as our knowledge of the subject goes, but the normal condition of the blood in childhood varies to such an extent as to make any valuable aid to diagnosis almost impossible.

There is one point however, in which it may aid us in the diagnosis of an obscure Empyaema, and that is in the examination of the Leucocytes. When there is any collection of pus in the body, the leucocytes are increased. There is one exception to this however, and that is in the case of Tuberculous/

Tuberculous Pus; where according to Hewiston (Birm: Med: Rev: 1902) a Tuberculous collection of pus, however large never produces any increase in the number of the circulating leucocytes, unless there is septic infection with it.

PROGNOSIS.

It is always safe to give a very guarded prognosis. Every case is a law in itself. The most healthy looking children die, and the unexpected always happens with those that look worst.

Given an early diagnosis of the case and proper treatment, the patient should make an uninterrupted recovery the disease leaving no deformity or distressing sequelae of any kind.

Dr. Peter Davidson, Senior Physician to the Liverpool Children's Infirmary, showed five cases of Empyema, treated in the manner described later; to the Liverpool Medical Institute. He first carefully covered the cicatrix of the wound with a patch of common plaster, he then stuck a piece of the same material on the corresponding site on the other side of the chest.

The medical men present were then asked to examine the cases, and to say which side had been diseased/

PLATE. IX.



An Empyaema on the left side almost healed,
showing very little deformity.

diseased.

No single man was correct in all the cases, and a large number were wrong in all. This I think shows pretty conclusively that Empyaema taken early and treated properly is not a dangerous disease as far as after results go. (PLATE IX.)

Empyaema is not by any means a rare disease, for the 450 cases I collected were from a total of 22,440 admitted to hospital, being 2% of the whole, or on an average of 21.4 per year.

It is very fatal too as one sees from the following lists:

In Great Ormond Street they had 214 cases during the years 1880-1892, 33 of which were fatal = 18.2%

In my 450 cases the death rate was 14.8%.

Foltanck in 1891 published 21 cases with 4 deaths = 19%.

Dr. Cantly in 1895 treated 84 cases with 14 deaths = 16.6.

Before we could make a true statement as to the death rate of all cases of Empyaema; we should need to make post mortem examinations on all the cases that died, it is the complications of Empyaema which rush the death rate up so.

Tuberculous Disease, Pneumonia, Pericarditis, Peritonitis, Meningitis, and Amyloid Disease being the/

PLATE. X.

Showing the ages at which Empyaemata most frequently occur.

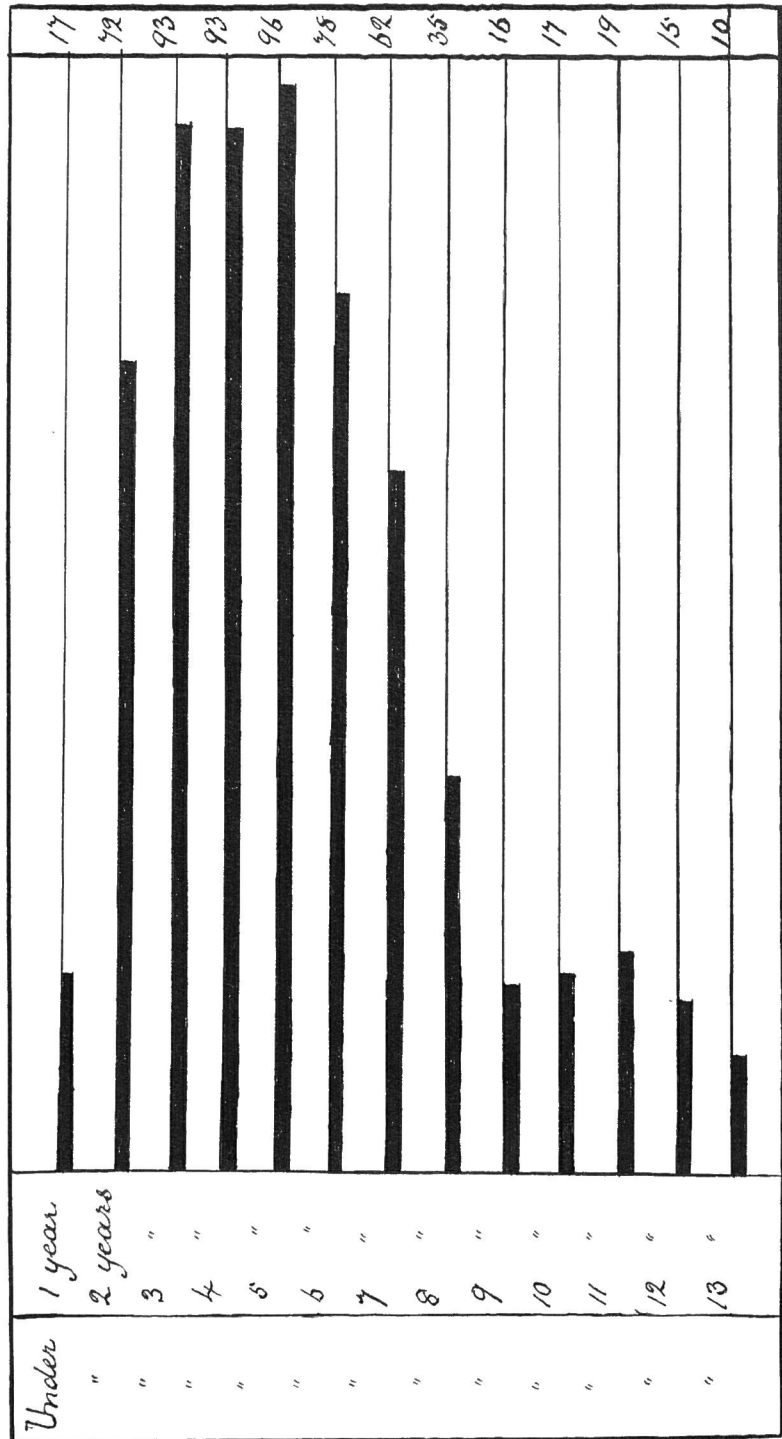
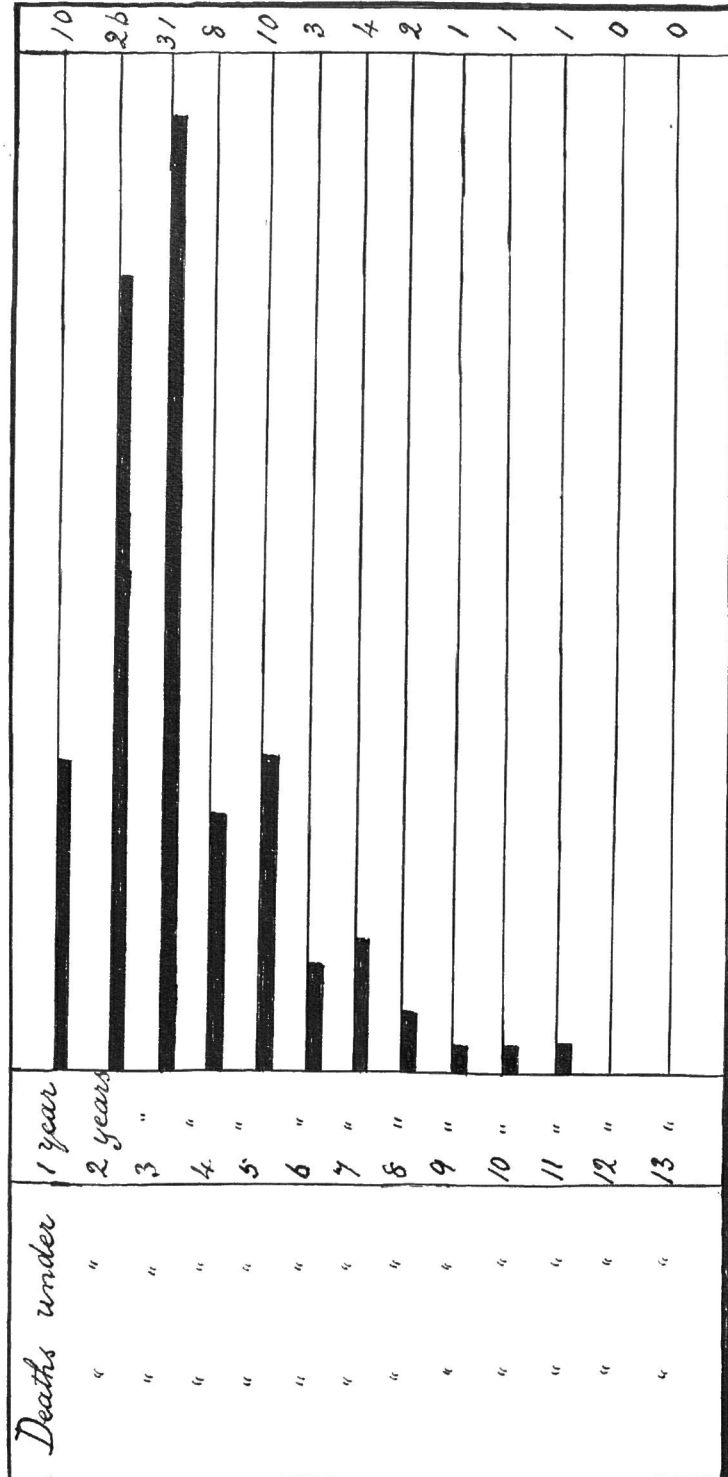


PLATE XI.

Showing the death rate in Empyaemata under the different ages.



the chief complications which beset us.

Age must be taken seriously into account in giving the prognosis in Children. PLATE X and XI.

Of my 450 cases

6 out of 10 died under 1 year.

18 " " 50 " " 2 years.

20 " " 59 " " 3 years.

6 " " 67 " " 4 years.

8 " " 71 " " 5 years.

Total 58 " " 257 " " 5 years

While only 9 " " 193 " over 5 years.

Wrightman in Lancet 1894 published

24 deaths out of 72 cases under 5 years.

and 5 " " " 52 " over 5 "

Great Ormond Street Hospital in the same year and journal published

8 deaths out of 27 cases under 5 years

and no " " " 13 " over 5 "

Dr. Coutts (Lancet 1895 records 27 deaths out of 43 cases under 2 years giving the awful mortality of 63%.

This shows at a glance, that the younger the patient, the more serious must be the prognosis.

Sex is of no importance in children, for a boy baby is not exposed any more than a girl. Yet statistics/

statistics show us that of 450 cases, 283 were in boys (62.9%) and 167 or 37.1% in girls; and of these the mortality worked out about even, 16% male and 12% female.

I can find no sex statistics from other Children's Hospitals.

Hofmokl's 60 cases of Empyaema of all ages; were made up of 42 males and 18 females. This preponderance of male is only natural here, when adults are considered, for you have the different mode of life and work coming into account. We have seen that Pneumonia is the principal predisposing cause, so man from his more exposed life must be more susceptible to it than woman.

The site and form of the Empyaema must also be considered in giving a prognosis. Of double Empyaema I have had no personal experience, but just as they are double so are they doubly dangerous. In Great Ormond Street the death rate for all cases of Empyaema was 11% but for double Empyaema it was 28.5% (Lancet 1894).

The site of the Empyaema, whether it be right or left is important. The close connection of the heart, for obvious reasons makes the left side the more dangerous. Though in passing it may be stated that the two sides are about equally susceptible.

My cases were in the ratio of .7 right to 15 left with a death rate of .1 Right and 3 Left.

Great/

Great Ormond Street had 52 cases of which 24 were Right and 28 Left with a death rate of .2 Right and .6 Left. Dr. Marshall's 7 fatal cases were 1 Right and 6 Left.

The risks attending the treatment of Empyema in Children might well be considered when giving a prognosis.

We have seen already that this is one of the most dangerous of operations as far as the anaesthetic is concerned; yet when certain precautions are taken these risks may be considerably reduced.

Risks arising from the Tube. Necrosis of a rib, or ribs is a common sequela from a badly fitting tube; especially in cases which have been treated by simple incision without resection. This is easily overcome by resection, or where possible by using a smaller tube.

Sometimes the tube is sucked into the cavity during a forced inspiration; but this is fortunately not a common occurrence; and when it does happen the tube must be instantly removed, even though an anaesthetic has to be given.

Haemorrhage is so rare as to be hardly worth considering. If it arises from the intercostal artery it is easily ligatured; but if from deeper parts, such as from granulations or from an abscess in the cavity it is more serious and more difficult to treat.

There/

There are certain risks pertaining to the local condition of the wound.

Excoriation for example, is due to the use of too strong a lotion, or from the dressing being unable to absorb the discharge, but spreading it over the surface of the skin and so acting like a dirty poultice. These slight troubles are easily remedied by removing the causes, and by applying a simple ointment at each dressing.

R	Ung: Boric	1 part.
	Ung: Zinci	2 parts.
	Vaseline.	3 parts.

A fatal result after the operation for Empyema so far as the general condition of the patient is concerned may be due to Septicaemia, Pyaemia, Amyloid changes or Organic disease.

In the pre-antiseptic days Septicaemia was very common, and arose chiefly from two causes.

Firstly from mixed infection at the time of the operation, and secondly from incomplete drainage due to the half-hearted surgery practiced.

Pyaemia was and is even rarer. I have seen only one case with secondary abscesses in the brain and lungs. Golder published one case in the Brit: Med: Jour: 1892.

These troubles, fortunately do not beset us often now as their treatment is almost quite hopeless.

The chronic forms of Empyema when from incomplete/

incomplete or improperly placed drainage, you have a fistula discharging pus for months, is the common cause of Amyloid disease.

This Amyloid condition does not prevent however further active treatment; (though it adds considerably to the risks); which should be done at once, even to further resection of ribs. Albumen in the urine may be due to other causes than Amyloid disease, for example it may occur as a sequela to Scarlet fever, which as we have seen is one of the commonest of the Zymotic fevers predisposing to Empyaema.

Valvular disease of the heart, other than congenital conditions, or those complicated with Rheumatic Fever are so rare in children that they may be put out of court altogether. Pericarditis, especially the purulent form, is not so rare, and must never be lost sight of as a possible fatal risk.

Tuberculous conditions alas, are also very common and very fatal. A Tubercular Empyaema will take longer to heal, if it heals at all, than any simple Pneumonical one and so spoil our healing averages; it is the same form which raises the mortality of Empyaema. Plate II.

It is of importance to note carefully whether we are treating a Tubercular Empyaema or an Empyaema in a Tuberculous patient. This is very difficult, for Tuberculosis in infancy, unlike that of later life, does/

does not begin by consolidation at the apices of the lung, with its definite signs, but is spread over the whole body. Either of the above conditions are serious, - and when the Tubercle Bacillus has been found in the discharge, or a definite history of Tuberculosis is elicited from the parents - so such must be your prognosis.

TREATMENT.

We must admit, that in Empyaema as in all forms there is of disease, the possibility of a natural cure or arrest of the disease. That is to say, a small collection of pus may become shut off by adhesions and may lie for years in a thick fibrous capsule, which in time becomes dry and caked.

As we have seen, according to Kracht, a simple serous effusion contains no organisms. In an Empyaema following Pneumonia, the active micro-organism is the Pneumococcus of Frankel, and as this organism is very short lived, it is soon overcome by the tissues. Here is a case then which has been converted into a simple effusion from a purulent one: and/

and which if it be not further infected will eventually become absorbed. Vide Plate I

Such cases have been recorded from time to time; especially in children who have suffered from Empyaema after Pneumonia and who have died from other causes and been examined Post Mortem.

Even though we admit the possibility of a natural cure, it should not alter our duty of following out an active line of treatment at once.

Cases of Pointing Empyaema the old "Empyaema Necessitatis" are now rarely seen. I have only seen one case and that was in a man aet. 56, where the abscess pointed just below the Right nipple, the spot being marked by pain, tenderness and oedema.

A localised patch of oedema must not be mistaken for an Empyaema. —

(Warburton Begbie (Syd. Soc. 1882) gives four cases of firm oedema of lower limb in simple serous effusion into the pleura.) — Though it is almost a certain sign of pus.

Following the local patch of oedema you have the formation of a subcutaneous abscess, and when the connecting sinus between the subcutaneous abscess and the Empyaema is small; the abscess may be mistaken for such, simply opened and left to drain - and drain it will for a very long time; but if the connecting sinus is large, the subcutaneous abscess will move with respiration, or even give the cardiac impulse/

impulse, in which case the diagnosis and treatment will be straight forward.

Empyaema bursting into the lung is as common or even commoner than that pointing externally, especially in children. I have had two such cases. The one being very interesting and instructive:-

A.B. aet. 6, admitted to hospital with diagnosis of Empyaema after Pneumonia. On examination he showed a small area of dulness at angle of scapula on right side. He was punctured and about an ounce of pus drawn off. Patient was then prepared for operation but during the night had a violent fit of coughing and expectorated about 8 ozs. of pus and a lot of mucous. Next day a portion of the 8th right rib was excised, over the site of the previous puncture; without the precaution of puncturing again on the operating table - and nothing was found. A small tube was inserted and patient put back to bed. The wound healed up in ten days and there was practically no discharge. Patient made an uninterrupted recovery.

There are a number of these cases published but they differ so widely in their main clinical features, with the exception of the coughing up of the pus, that one can deduce no rule from them except to operate as soon as the Empyaema is diagnosed. These cases as a rule make a good recovery, and/

and although the pus may pass from the pleural cavity into the bronchi, there is seldom any air passes back. This may be accounted for by the fact that after the Empyaema has burst into the lung, and while it is still blocking up the fine tubes adhesions are formed behind, before the bronchi are clear of pus once more .

There are many other ways in which an Empyaema may "wander forth," e.g. by bursting into the oesophagus or by passing between the crura of the diaphragm down the sheath of the Psoas muscle and so simulate a Psoas Abscess; but of these forms I have had no experience.

The treatment proper of Empyaema can be divided into two

Medical and Surgical.

Under the first heading we can put those cases of natural cure, or those cases which have burst into the lung substance.

Once the exploring needle has shown pus in the Pleural cavity, the only proper treatment is surgical.

There are various operative methods of treating Empyaemata, all aiming at three cardinal results; namely (1) to empty the cavity of pus, (2) to keep it aseptic and drained; and (3) To allow the lung to expand.

Let/

Let us look at a few of these methods.

- A. The old routine treatment, introduced by Galen, of repeated punctures or aspirations has happily gone out. I have never tried it but have seen it done. The Patient a child, aet. 4 months, was subjected to 10 punctures in all, from which a grand total of 100 oz. of pus was collected. During this treatment the child grew steadily worse; and in the end when a rib was resected the shock was too severe for the patient's weakened condition and she died. Paget has collected the following record of treatment by Puncture. He says "So late as 1872 M. Bouchert published as an instance of good and profitable surgery, a case of Empyema in a boy aged 9. cured in 18 months after 58 punctures. In another case he punctured the chest 120 times in 11 months. Lily records a case when he made 56 punctures. Gimbert in a child 11 years old, made 74 punctures in 9 months, obtaining a grand total of 39 pints of pus. And the worst of it all is that out of 48 patients thus tormented, only six were cured."

That this method introduced in a septic age, when to put a knife into a patient meant death, should be attempted to-day is both cruel and foolish. It so happens that this method is successful in a few cases of small circumscribed Empyemata/

Empyemata in young children; or it may act palliatively in cases which are too far gone to stand a more severe operation ; but this is about all that can be said for it.

B. Bulair's Permanent Syphon-drain.

This is carried out by means of a long rubber tube with one end in the patient's chest, passing through a simple canula wound, and the other in a bowl of antiseptic lotion under the bed. The fluid in the length of tube is supposed to overcome the atmospheric pressure, and so expand the lung while draining the cavity at the same time. This is perfect in theory, but unfortunately it never works; for the simple reason you can not make an air tight joint between the chest wall and the flange on the tube. Air gets in, the canula is easily blocked by clots, and at the same time it acts as a constant source of irritation, for it is left in for at least 8 days.

Sloughing of the skin, or necrosis of the rib follows and as a result failure.

C. Simple Incision without Resection.

At present this operation is in disfavour, though it has many supporters and may be revived again.

The chief points in its favout are :-

1. It is a very simple operation, and can be performed/

performed on a patient who might not stand the shock of resection.

2. It might be done without a general anaesthetic; and the speed with which it can be done, minimises the risks from an anaesthetic.

Its chief disadvantages are as follows:-

1. There is usually hardly enough room between the ribs to allow of free and proper drainage. This is especially so in children, where the ribs in front are almost laminated.
2. For the same reason, the drainage tube is nipped, and acts not as a drain but as a cork. While it not uncommonly causes necrosis of the ribs, with the result that resection has to be resorted to in the end.

Foltanck published 21 cases of Empyaema in children, treated by simple incision without resection, with only 4 deaths.

Rosenbach, has recorded 15 cases of all ages, treated in the same simple method, every one of them successful. These facts from two such authorities as Foltanck and Rosenbach, speak for themselves. They are indeed excellent.

On the other hand, out of 54 post mortem examinations made in Great Ormond Street on fatal cases of Empyaema; there was only one instance of necrosis of rib after resection, while there were several instances of caries of rib from prolonged/

prolonged pressure of the tube where simple incision alone had been practiced.

Again in 1894 Batten of Great Ormond Street published cases where resection was always practiced; and Wrightman of Liverpool Children's Infirmary published cases where simple incision was the rule, with this striking result :-

	Great Ormond St.	Liverpool.
Death rate in all cases	11 %	20 %
Death rate under 3 years.	12 %	50 %
Death rate in Double Empyaema	28.5%	84 %

D. Treatment by Resection.

The complete operation of incision and resection of a piece of one or more ribs is as old as Hippocrates.

This is the operation which is most commonly done at the present day, and the one with which I have seen the best results.

Octavius Sturges in the Lancet of May 1894 says with reference to his experience of the cases under him in Great Ormond Street.

"In all cases of Empyaema in Children resection of rib is absolutely necessary."

We have only to look back to the beginning of this paper to find that this was the treatment/

treatment as practiced by Hippocrates, and practiced successfully too. Then turn back and compare Wrightman's list with that of Battens. I have never seen any fatal results from shock, due to resection; then why hesitate to do the most complete operation right away? I had a master once at school, who used sometimes to send one boy to cane another. Did that boy give the other a gentle lick? Not he! If he did down came the master in all his wrath, and gave that pseudo-lictor two cuts to show him how it was done; then he attended to the original and unfortunate victim in proper style.

"Aut optimum, aut nihil."

The operation of Resection can be divided for purposes of description into the following steps or headings.

1. The Anaesthetic.
2. Position of Patient.
3. Exploratory Puncture.
4. Steps of the actual operation
5. Evacuation of the pus.
6. Dressings and Tube.

1. The anaesthetic: That an anaesthetic must be used is obvious/

obvious in so severe an operation, and because it is so severe special precautions should therefore be taken. The patient should not be starved too long and a little stimulant should be given immediately before the anaesthetic is about to be administered. Chloroform is "par excellence" the best and safest of anaesthetics to use for children. It is easily administered and there is no cumbersome apparatus to interfere with or hamper the movements of the surgeon or anaesthetist. Once the patient is deeply under, the anaesthetist can hold the simple mask over the patient's face with one hand, while with the other he can steady the arm of the side on which the operation is being performed. When the skin incision has been made and the piece of rib resected, the patient should be allowed to gradually recover consciousness. In this way he will assist the operation considerably by coughing violently and thus expelling the large clots of fibrin and pus.

II. Position of Patient.

Most authorities agree that it is very dangerous to roll the patient over too far on to the sound side; especially if the Empyema be a large one, or on the left side; for the action of the heart or sound lung is easily interfered with.

Yet the same authorities say it is best to operate/

operate or drain the Empyaema in as dependent a position as possible.

How are you to do this? I have never seen a fatal accident on the operating table. This good result is due I think to the following mode of procedure.

Take for example the case of a large right sided empyaema, with removal of a portion of the 8th right rib at the angle of the scapula. Place the patient on the right hand side of the operating table, so that his spine lies almost over and on that edge of the table. The anaesthetist can hold the patient's right hand in his left and so draw upwards and forwards the angle of the scapula, while a Nurse can hold the patient by the thighs to prevent him from falling off the table.

Thus you have the whole of the patients' diseased side exposed, without rolling him over to the sound side in the slightest degree; and by bending down you can perform the operation - if not at your ease, at least easy in mind that the patient is in the safest possible position.

III. Preliminary Puncture.

It is every bit as important to make a preliminary puncture before operating for Empyaema, no matter what form your operation takes, as it is to sound a patient's bladder before operating for stone.

stone.

This preliminary puncture should be made, not over the site of your diagnostic puncture, but below the piece of rib you are about to excise.

It will prove to you that such is the correct piece of rib to remove, and it may save the necessity of further operation. E.G. The case quoted further back in which the child had expectorated the pus during the night.

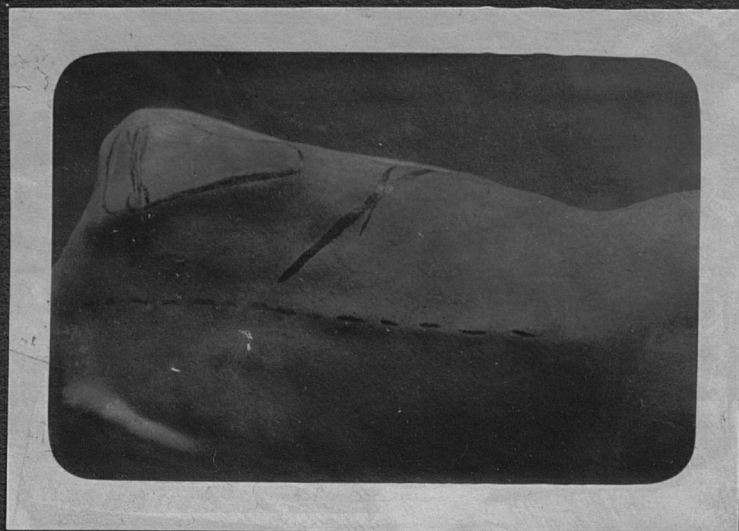
I need hardly remark here, that the needle and modus operandi of this preliminary puncture is the same as has already been described on Page 20, : and that the patient has been prepared for this operation, by having had his side well washed with soap and water, aether, and a carbolic compress (1 in 60) on over night.

IV. The Steps of the actual operation.

- a. The Skin Incision.
- b. The Periosteal Incision.
- c. The Re-section of the piece of the rib.
- d. The Puncture of the Pleura.

IV a. The following method of procedure is applicable to any portion of any rib; but for the descriptive purposes let us take the commonest site, the 8th right rib at the angle of the scapula in the posterior axillary line. As will be seen in the/

PLATE. XII.

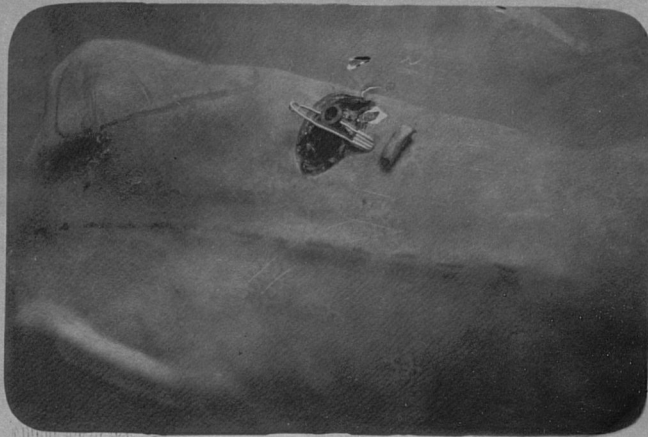
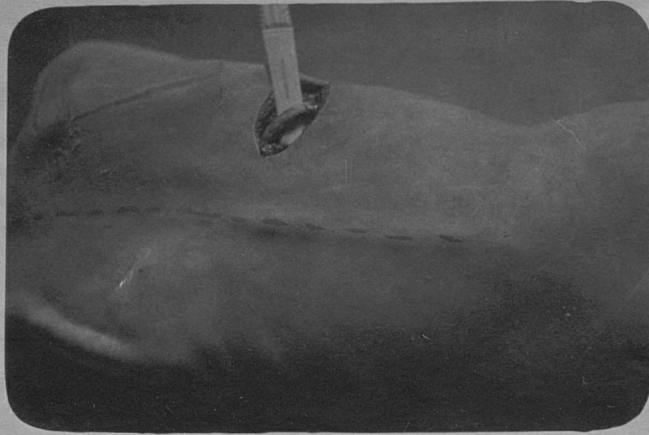


the photograph (Plate XII. Fig.1) the line drawn along the rib, with the line of the skin incision crossing it at a very acute angle. I have found from actual experience that it is far more difficult to make your incision parallel to or over the portion of rib to be excised, than to make it cross the site a little obliquely. The skin should be held firmly above and below with the fore finger and thumb of the left hand, while the incision is made in one sweep down to the periosteum.. There is seldom any haemorrhage, which cannot be controlled with one or two dabs of a swab.

IV.b. Next carefully expose the periosteum and incise it down to the bone, with an "H" shaped incision. The horizontal bar of the letter to be one to one and a half inches in length, and parallel to the rib. Dissect back the flaps thus made with a curved periosteum elevator, and pass it carefully round the inner side of the rib (Plate XIII Fig.I) till the periosteum is quite detached all round that portion of the rib which is to be resected.

IV.c. Next with a plain straight nosed pair of rib forceps nip through the rib where the upright lines of your periosteal incision were. The patent curved forceps and a saw are quite unnecessary in children, for the ribs are barely ossified even at the/

PLATE. XIII.



the age of 13. Many authorities say it is quite unnecessary to save the periosteum, but that the rib should be removed along with its covering.

There are two distinct advantages in the above method :- first you save the periosteum for the future reconstruction of the rib ; and secondly you do not wound the intercostal vessels and nerves of the rib resected, for they are detached and left in situ with the periosteum. This is an important feature, for it is from the Intercostal artery you have the principal source of danger from haemorrhage. At this stage you should have a condition of affairs such as is seen in Plate XII Fig.2 The two raw ends of the rib with the thickened and fused periosteum and parietal pleura bulging between.

IV.d. The puncture of these combined layers can be most safely done with a pair of dressing forceps, which will not wound any internal structure and which can be easily opened to enlarge the wound to a convenient size.

V. The rule for the method of evacuating the pus is as old as Hippocrates. That is it must be allowed to escape slowly, more especially if the Empyæma be a left sided one.

the dangers from too rapid evacuation being
1st/

1st, the patient may faint, because the heart having been greatly displaced by the pus is rapidly restored to its original site, which shock may cause it to cease beating, and 2nd, as in rapid evacuation of a simple serous effusion you get the condition known as "Expectoration Albumineuse," so you may have a similar condition in Empyæma, and the patients lungs being suddenly congested, along with the depressing effects of the chloroform, he may be suffocated. To guard against this, it is only necessary to hold a plug of gauze over the wound, and allow the patient to come round gradually, when he will cough violently, and if still maintained in the same position on the table the cavity can be easily and quickly emptied.

One or two questions must now be considered, before one proceeds to dress the case.

1. Ought the Surgeon to examine the cavity of the Empyæma with his finger? It is my opinion that this should always be done; because you can break down and remove any large clots of fibrin, which would otherwise take time to become broken up and removed, and at the same time you can define absolutely the size and contour of the cavity. The finger should be inserted as carefully and as gently as possible, lest you break down any adhesions between the visceral and parietal layers/

layers of pleura; for this is a source of danger in the first place from haemorrhage, and in the second place, as we shall see later, an unnecessary act. Bouveret advocates it for the reasons given.

Paget records a case where the Surgeon while exploring the cavity of an Empyema discovered a bulging pericardium, which he promptly opened and drained through the incision in the chest wall.

2. Should one curette the walls of the cavity? No! or how are you to save the adhesions referred to above, or arrest the resulting haemorrhage.

I have never curetted myself, or seen it done and I fail to see what good it could do.

3. Should the cavity be syringed out at the time of the operation?

Schele says "I always wash out the cavity at once, and if that does not seem satisfactory, I rub its walls and give them a good scrape with a Volkman's spoon. It is very important to have the cavity disinfected once and for all, and I abhor subsequent irrigation." This is indeed bold treatment. I have only seen the syringe used once very gently with a warm boracic lotion, and the patient nearly died. Such, is also the experience of others whom I have asked.

Why is this? It seems the most natural thing in/

in the world to wash out a large abscess cavity. I suppose it is the sudden impingement of the fluid against the Pleura or Pericardium, which reflexly inhibits the action of the heart.

Bouveret in 1888 published the case of a boy aet. 11, with a left sided Empyaema who was treated by incision and irrigation with warm lotion; the lotion was thrown into the chest with an enema syringe. On the sixth day some violence was used in irrigation; and the boy lost consciousness, stopped breathing, and was convulsed; he remained unconscious with Cheyne-Stokes respiration and died the same evening. Temperature 104 F.

The practice then is too dangerous for the results which are never very good.

VI. The Dressings and the Tube.

Having emptied the cavity of the Empyaema as thoroughly as possible, by rolling the patient if necessary further over on to the affected side; you next proceed to dress the wound. The first item in the dressings is the drainage tube. There have been invented and devised, at least a dozen different forms of drainage tube for the treatment of Empyaema.

There are some with valves, others with flanges/

et cetera; but none are so simple, so effective, or unlikely to get out of order as the plain rubber tube, with a safety pin fixed through the end to prevent it from slipping in or out.

Round and over the external end of this tube is wrapped a piece of cyanide gauze, which acts as an effective valve and still further tends to keep the tube in position Plate XIII Fig 2. The size and length of tube to be used, depends on the size of the cavity and the space between the ribs. It is best to begin with as long and as thick a piece of tubing as can be comfortably inserted. It is easier to reduce than to increase as the case progresses.

The dressing is not the least important part of the treatment. It has three functions to fulfill :-

1. It must absorb all the discharge into itself, and this for the first three days is usually excessive.
2. It must prevent infection from passing into the cavity, and,
3. It must be comfortable and allow of easy respiration.

The dressing which carries out the above as thoroughly as any I have seen tried is the following:-
of
First a layer of cyanide gauze, as described, then a large/

large quantity of well teased out carbolised tow, commonly called Stympium; and over this a thin layer of wood wool, or ordinary absorbent cotton wool. These to be held in place by a woollen many-tailed bandage. The above is the cheapest, - and this is a great factor in Hospital as well as in Private practice, where a case has to be dressed say 120 times, - most comfortable, and effective dressing there is.

The after treatment varies a good deal. Every case is a law in itself. Some children who look strong and healthy will pine away and die, in spite of all efforts; others who look like half starved rats will grow slowly but surely fatter and stronger.

It is interesting to note, in passing that the child always lies on the diseased side before the operation, in order that the healthy lung may have full play; and that for 48 hours or so after the operation, he lies on his back, which is an unnatural position for a child to lie in (Vide Darwin) this is because the wound is a little uncomfortable or painful; but that after the first few days, he rolls on to his diseased side or face at will, and sleeps like a top.

The saddest part of all the treatment of Empyaemata in Children is the daily dressing.
(Vide Frontispiece)/

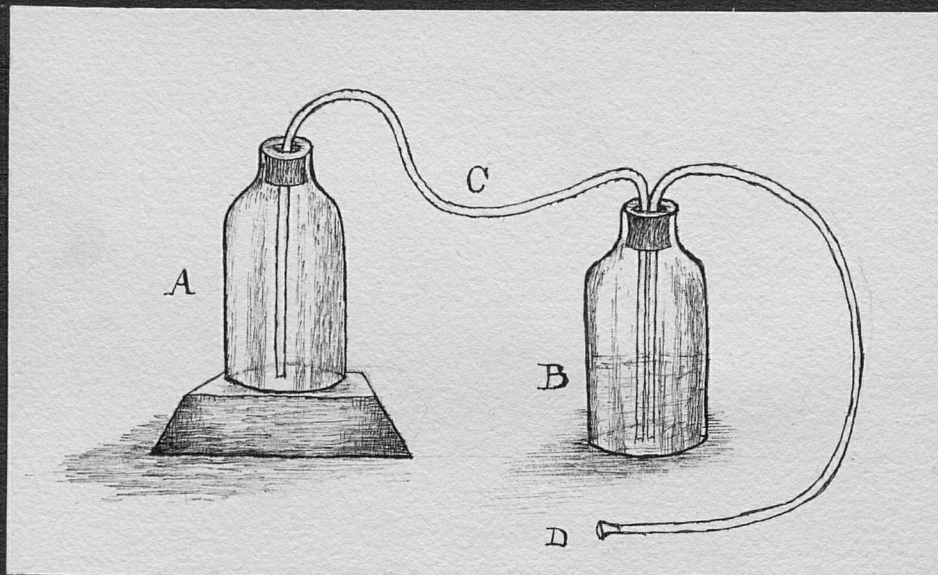
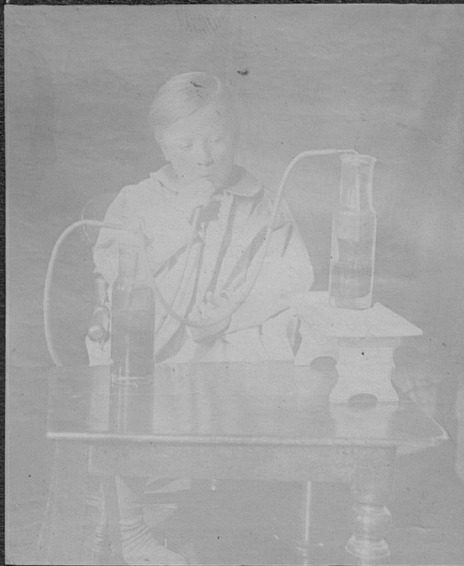
(Vide Frontispiece). The man who can invent a dressing which will last a week, is conferring a boon to many a brave little sufferer. The poor little mites are hurt and frightened at first and they almost invariably cry at the daily dressing, even at the end of the fifth or sixth week.

This dressing must be changed twice a day for the first few days, according to the case, and then once a day to the end of the case. There is no change in this daily dressing, from that described at the operation; except that as the discharge gets less, you gradually shorten the tube; and when the fistula is quite dry - not till then - remove it altogether and pack the small hole with gauze. The chief point to notice is, never remove the tube for some days after the discharge has quite ceased. Many cases under my care were sent to the Convalescent Home with the tube still in, and seeing no discharge the Nurse removed the tube too soon, with the result that the patients had to undergo a second operation.

PLATE. XIV.



An Empyaema of the left side, after 6 weeks treatment, showing how fat the children sometimes become.



The Spirometer described in text showing
also how it is used.

expand the collapsed lung so much as healthy exercise.

I made several Spirometers for my Children after the pattern devised by Holt. Briefly it is this :- Two large bottles A and B are connected by a syphon tube C. The one bottle A being raised a little, so that the fluid will always return to B.

D is a small china mouthpiece taken from a toy trumpet and leading to bottom of bottle B. Into B I used to drop a few crystals of Potassium Permanganate, and fill up to the neck with water. The child was told he would receive a penny if he could "blow" all the coloured water (for the Pot. Permang: had the double action of making the water a pretty colour and at the same time acting as a disinfectant) into the other bottle.

This proved a constant source of amusement to the children, and at the same time helped to expand their lungs. Plate. XV.

Profuse granulations often form round the edge of the wound, and tend to close it too soon, these are easily got rid of by the application of a little Cupric Sulphate. (Blue Stone).

The time taken to cure an Empyema - from the day of the operation till the child leaves the hospital, with no discharge, the wound healed, and the lung on that side fully expanded, - varies considerably. The average for my 450 cases was 56 days. The average for Wrightman's 124 cases was 72 days. The/

The average for Sturges 48 cases was 6 weeks in Hospital, and 3 in Convalescent Home = 56 days.

The average for Runeberg's 46 cases was 48 days.

The average for Bouveret's 61 cases was 49 days.

The average for Glaser's 20 cases was 90 days.

The average for Brunnicke's 3 cases was 19 days.

Averages are of little value except in giving and a prognosis, except to show which is the better method of treatment.

Bouveret says an Empyema treated properly, within a month of its formation should heal in 29 days. This is very quick work indeed, and only applies I should say to small circumscribed pneumococcal Empyemata. The same authority goes further, and says if it is not treated for three months after its formation, it will take proportionately longer to heal, namely 72 days.

There are many factors which work together to rapid healing :-

Prompt and proper treatment, good food, rest, fresh air and sunlight.

The theories as to how the cavities are obliterated are interesting.

Roser's Theory is that the cavity heals up from the bottom by the band of cicatrical tissue gradually contracting and drawing the collapsed lung out to the chest wall.

The bands of adhesions, - which we were so careful not to break down, when we passed our finger into/

into the newly opened cavity - contract and gradually draw the lung out, or rather fix it after a fit of coughing has blown the lung out. Here it is, one sees why the dressing must fit properly and if possible act as a valve, which will allow pus and air to pass out of the cavity, but nothing to pass back.

This is the great secret of early healing in Empyaema.

There is never (or very rarely) any deformity after a simple case of Empyaema, which has been treated as described above. It is only after a chronic fistulous case, when resection of a number of ribs has been done that this happens, and these cases are usually over 13 years of age.

I have never had a case, however severe or chronic, where it was necessary to resect more than a portion of one rib, and never one which showed the slightest deformity.

It is only necessary to conclude this chapter, by saying a few words on the treatment of double Empyaema.

This is done in exactly the same way as for a single Empyaema, but you do not operate on both sides at once. You had better prepare the worst side for operation and aspirate the other, before the anaesthetic is given. The second side can be treated about a week/

about a week later.

In health if both sides of the chest were opened the patient would die at once from asphyxia but in Empyaema, paradoxical as it may seem nothing untoward happens.

These cases are very difficult to treat and the mortality in them is exceedingly high from 50 to 80%.

CONCLUSION.

In concluding this paper I need only say I have not meant to be dogmatic however so I may seem to have been. The treatment I have recommended is the one with which I have had the best results. The 450 cases I speak of were collected from old hospital reports, and represent almost all the forms of Empyaema treated in the different methods described.

I had 22 of those cases under my own observation, and treated them myself.

The photographs, and drawings are original unless otherwise stated. The former, as will be seen from their poorness, were taken with a small hand camera.

Hugh Meredith Speirs

April. 1904.

PHYSICAL DETERIORATION

being mainly

AN INDICTMENT

against the

CITIES OF THE TIME

C. W. Saleby

7 Mandeville Place
Manchester Square
London



W/.